

Autonomous Assessment of Airspace Operations, Phase I

Completed Technology Project (2018 - 2019)



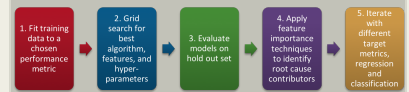
Project Introduction

NASA's 2018 SBIR solicitation topic A3.02 requests "Autonomous systems to produce any of the following system capabilities: Prognostics, data mining, and data discovery to identify opportunities for improvement in airspace operations." Identifying opportunities for improvement is a critical ongoing need in the air traffic management domain, for which achieving high levels of performance is a daily concern. Its importance will continue as traffic volumes grow and new vehicle classes are introduced. In particular, as new Urban Air Mobility (UAM) operations become more prevalent, methodologies to quantify performance of both human-centered and autonomous operations will be required. The objective of this work is to discover opportunities for improvement in operations of the National Airspace System (NAS), using methods that advance the state of the art and that can be applied to both current and future operations. To that end, Mosaic ATM proposes to develop a tool that will characterize and classify the efficiency of airspace operations, with a focus on airport metroplex operations. We propose to leverage the latest in machine learning techniques to create supervised and unsupervised machine learning models, which will be trained and validated using large sets of archived flight and weather data. These models will be able to identify the most critical causal factors for degraded performance conditions, in a way that is comprehensible to an analyst. We will provide a user interface to explore the model results and causal factors. This work will support planning for UAM operations as well as informing NASA and other stakeholders where further investments in NAS automation are most warranted.

Anticipated Benefits

The proposed capability will enable NASA to find opportunities for improvement in airspace operations. The capability will integrate with NASA's Sherlock Data Warehouse, so it will be immediately available for NASA use. Possible applications include: guiding future research and development efforts toward areas of the NAS that have the most opportunity for improvement; evaluating the potential impact of new operations and aircraft types; and examining NAS performance trends over time.

The proposed capability has applicability to both airline operators and air navigation service providers like the FAA. Both sets of stakeholders have a vested interest in identifying root causes of sub-optimal airspace performance, so that they can take steps to address them. Mosaic ATM envisions a dashboard that will enable airline and FAA decision makers to gain actionable information about areas in need of improvement, at the facility level and produced within one day of operations.



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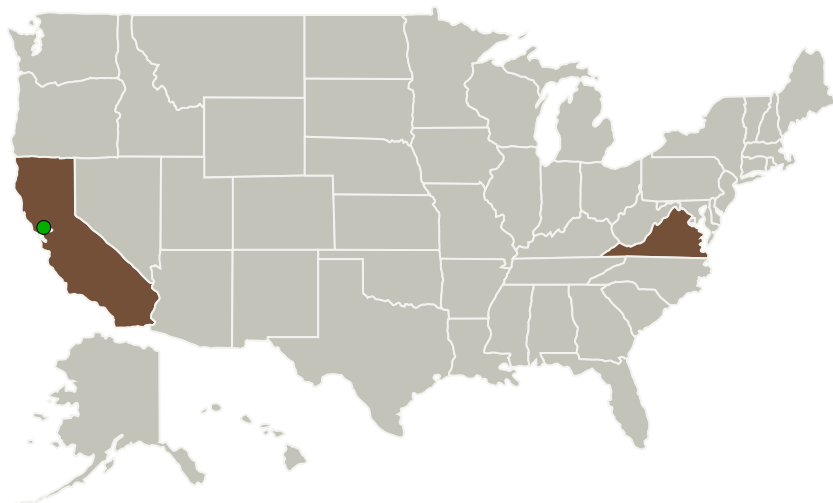
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Mosaic ATM, Inc.	Lead Organization	Industry	Leesburg, Virginia
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations

California	Virginia
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Project Transitions

July 2018: Project Start

February 2019: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140944>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Mosaic ATM, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

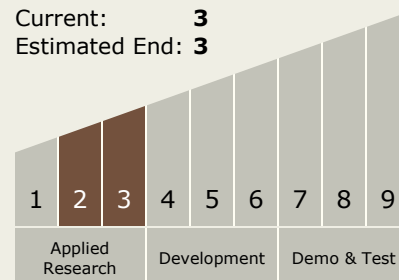
Carlos Torrez

Principal Investigator:

Michelle Eshow

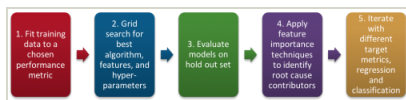
Technology Maturity (TRL)

Start: **2**
 Current: **3**
 Estimated End: **3**



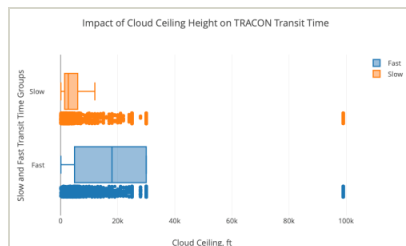


Images



Briefing Chart Image

Autonomous Assessment of Airspace Operations, Phase I
(<https://techport.nasa.gov/image/133045>)



Final Summary Chart Image

Autonomous Assessment of Airspace Operations, Phase I
(<https://techport.nasa.gov/image/126637>)

Technology Areas

Primary:

- TX01 Propulsion Systems
 - TX01.3 Aero Propulsion
 - TX01.3.1 Integrated Systems and Ancillary Technologies

Target Destination

Earth